XAIRCRAFT

MINIX

User Manual

V1.0

CONTENT

DISCLAIMER OF LIABILITY

1. Using XAircraft products within the limits permitted by local laws and regulations. XAircraft is not responsible for any illegal activities.
2. The MiniX is an aeromodelling product only. Please strictly follow the aeromodelling safe instruction rules; XAircraft are not responsible for the use and operation of the aircraft.
3. Model aircraft are not toys! Fly under professional guidance and strictly follow instruction rules in this document. XAircraft is not responsible for consequences caused by improper installation, incorrect setting or operation.

.Security Notes

1. Familiarize yourself with flying environment and any obstacles. Identify any potential hazards such as power lines, cars, people, etc.
2. Do not fly the aircraft when fatigued, drunk or your mental state has been compromised which may cause an accident.
3. Stay away from wet areas. Do not fly in the rain or wet environments which can cause device failure and probably lead to danger. Do not fly at night or in windy conditions.
4. Stay away from any fire resulting in damage of the electronic parts or others such as the flight battery.
5. Do not fly alone during your preliminary flights. If you need help, please enlist the aid of an experienced pilot before flying for the first time.
6. Prepare rescue tools such as cell phones or other communication devices should you need to call for help.
7. Please fly under the safe take-off weight, do not overload the aircraft otherwise will lead to danger.
8. Ensure all the equipment operates correctly before flight and that there is no transmitter interference or conflicts.
9. Do not touch any moving or powered parts. Do not try to catch the copter which has rotating motors or blades for example. Keep loose clothing away from moving parts as they may get caught and could cause physical harm.
10. Always throttle down to minimum before flying.
11. Remove the propellers when testing the remote device or motors operation. Attach the propellers after you have tested that everything is working good to prevent an accident.
12. Assemble the aircraft with accessories XAircraft provides. XAircraft is not responsible for any consequence resulted from assembly with other accessories or modifications.

XAircraft MiniX Overview

XAircraft MiniX is designed for multicopter, support 2 to 8 rotors.

Products Specification

MiniX Construction

Flight Controller System

The Flight Controller is the core of the system and is connected to GPS/compass and RC receiver for flight. It also has the black box flight data recording function which maintains the flight records for 40 minutes allowing users to view and share flight records.

GPS Module

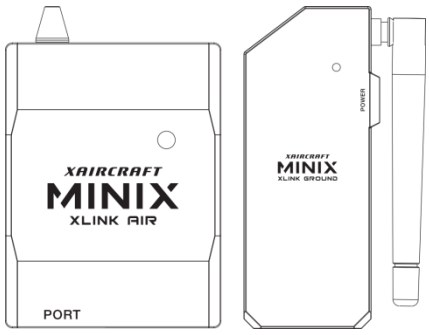
GPS is used to identify the location of the aircraft and it's heading via the compass.

OSD Module

The On Screen Display module is an accessory.

It superimposes flight data over your video image for the pilot*. Aircraft attitude, flight mode, satellite number, height, speed, and voltage alarm information is provided in real time.

*Other equipment required for viewing



XLINK GROUND STATION

Includes XLINK AIR and XLINK GROUND modules.

XLINK AIR is connected to the FC on the aircraft with XLINK GROUND connected to a computer, mobile phone or tablet to allow route planning by ground station.

MiniX Features

1) Three flight modes supported: Manual ,ATT and GPS
2) ATT and GPS mode offers a high accuracy altitude hold.
3) More security options are available. For example the onboard failsafe can be preset for GO-home, auto landing/hover and can auto land at low voltage.
4) Built-in green configuration software for PC, no need to download any drivers or additional software.
5) Digital ground station communication and control modules allow Android Tablet App operation and flight data.
6) Built-in Black box flight recorder module extension and firmware upgrade support
7) Intelligent low voltage protection

MiniX Technical Parameters:

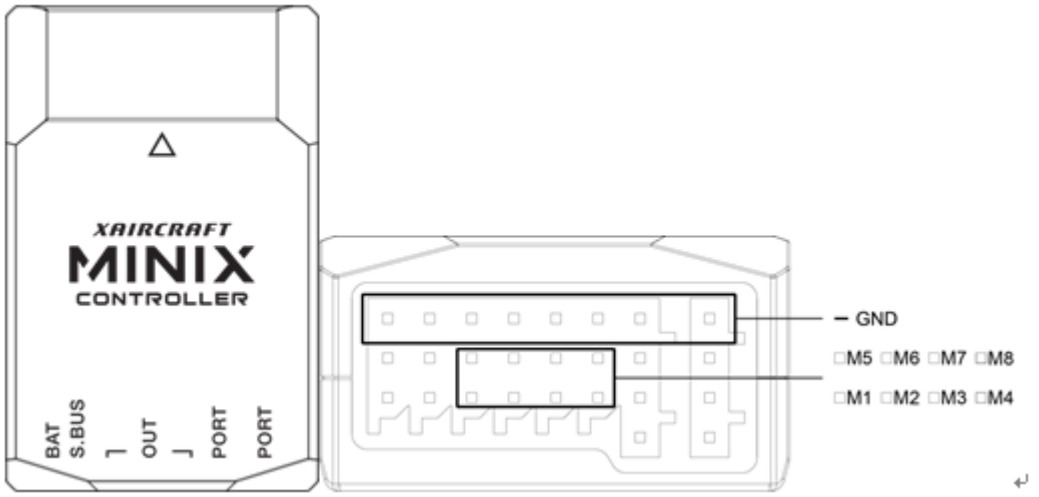
Performance	Description
Output characteristics	333Hz ESC control frequency defaulted standard ESC UltraPWM output configurable 100HzServo control frequency
Hover precision	Vertical: ±1.0m Horinzontal：±2.0m
Anti-wind capacity	<8m/s (17.9mph / 28.8km/h)
MaximumRudder angular velocity	200°/s
Maximum tilt angle	35°
Maximum lifting speed	±5m/s

Working environment	-10°C ~ 55°C
Radio	
Configuration software	Windows system ONLY
Super Anti-Magnetic interference	
Bulit-in Black box support	
Configurable UVP support	
SBUS or PPMreceiver (normal types requires SBUS switch module) support	

Module Parameters:

Product	Voltage	Weight	Dimension
FC	Input Voltage : 7V~50.4 V (2S~12S) Output Voltage : 5.8V , ≤3A	21.6g	L : 45.4mm W : 30.15mm H : 17.43mm
GPS	4.8V ~ 6.0V	17.5g	Diameter : 50.6mm H : 16.2mm
OSD	4.8V ~ 6.0V	4.3g	L : 32.7mm W : 18.8mm H : 9.3mm

MiniX Interface



PORT	Function
BAT	Power，Li-Po battery（2S~12S, 7V~55V）
S.BUS	Receiver
OUT(1,5)	M1/M5 ESC（Black/white cable to M1，Red/Orange cable toM5）
OUT(2,6)	M2/M6 ESC（Black/white cable to M2，Red/Orange cable toM6）
OUT(3,7)	M3/M7 ESC（Black/white cable to M3，Red/Orange cable toM7）
OUT(4,8)	M4/M8 ESC（Black/white cable to M4，Red/Orange cable toM8）
PORT	Extension Module
PORT	Extension Module

S.BUS/PPM CHANNEL SETTING

Channel	Description
CH1	AILE / Roll
CH2	ELEV / Pitch
CH3	THROTTLE
CH4	RUDD / Yaw
CH5	Flight Mode
CH6	Safe Mode
CH7	Attitude

MiniX Flight Mode

Flight Mode	Performance	IO	Explanation
Manual Mode	No Auto-Horizontal ability, no height hold function	M	Not recommended for beginners.
Attitude Mode	Auto-stabilize after sticks released. Height held at throttle center. Pilot commands multirotors position.		
GPS Mode	GPS signal is available with five satellites or more, auto-stabilize after sticks released and enters GPS position hold.Height hold at throttle center.		When M input unconnected, MINIX is in GPS ATT Mode by Default.
	Note, If GPS Module is disconnected, GPS signal lost or weak, or the compass receives interference, ATT mode is entered automatically		
Safe Mode	Autopilot Mode in emergencies, Return to Home (Tail in) and auto landing by default.	S	

LED Indication

Red LED flashing means do NOT fly. Red flashing in the air when RTH not commanded: the pilot should land immediately and check the multi rotor.

	Flight Status	LED
Flight Mode	Manual Mode	Blue flashing
	Attitude Mode	Green flashing
	GPS Mode (Good Signal)	Green-Green flashing
	GPS Mode (No Signal/Signal is weak)	Green-Red flashing
	Safe Mode	Red-red flashing
Calibration	Enter Calibration Mode	Purple flashing
	Calibration Completed	Solid Green

Firmware Upgrade	Upgrading	Green flashing
Error Status	System initialization or Self-check has failed(System can be initialized in 10mins, it may take a little more in code weather	Solid Red
	System error: module communication failure or RC signal incorrect. Strong interference of magnetic happens in GPS Mode.	Red flashing
	Weak signal or interference of Compass in GPS Mode.	Yellow flashing

MiniX Quick Guide

XAircraft MiniX is an easy-to-use product. User can start to fly after few setups.

1. Install every module according to manual, and then connect the ESC. See: *Copter Types MiniX Supports*. **Notice: do not install the blades in order to personal safety during the setting process.**
2. Connect to configuration software (*MiniX Connect with Computer*) and choose correct copter types and ESC. If you use UltraPWM ESC, please DO select corresponding option. Wrong ESC setting can lead to danger! See: *Copter Types MiniX Supports.*
3. RC Calibration: *Compass Calibration completed when* re-power on.

Notes for Use

- Do not use GPS ATT Mode and Return to Home function in the areas which suffer from magnetic interference, for example, between buildings or indoor .
- If calibration keeps failing check if there is strong magnetic source interfering GPS module
- If you fly in a new place should re-calibrate the GPS Compass Module.

4. RC Neutral Point Calibration, *RC Reverse Calibration.*
5. *Compass Calibration.*
6. Double check whether the wiring of ESC and motor is OK. After motor rotation is confirmed right, install the blades then fly.
7. During the flight, you can use gain knob (G channel) to adjust the aircraft' s auto-leveling performance. Please see the detail: *Attitude Gain*.

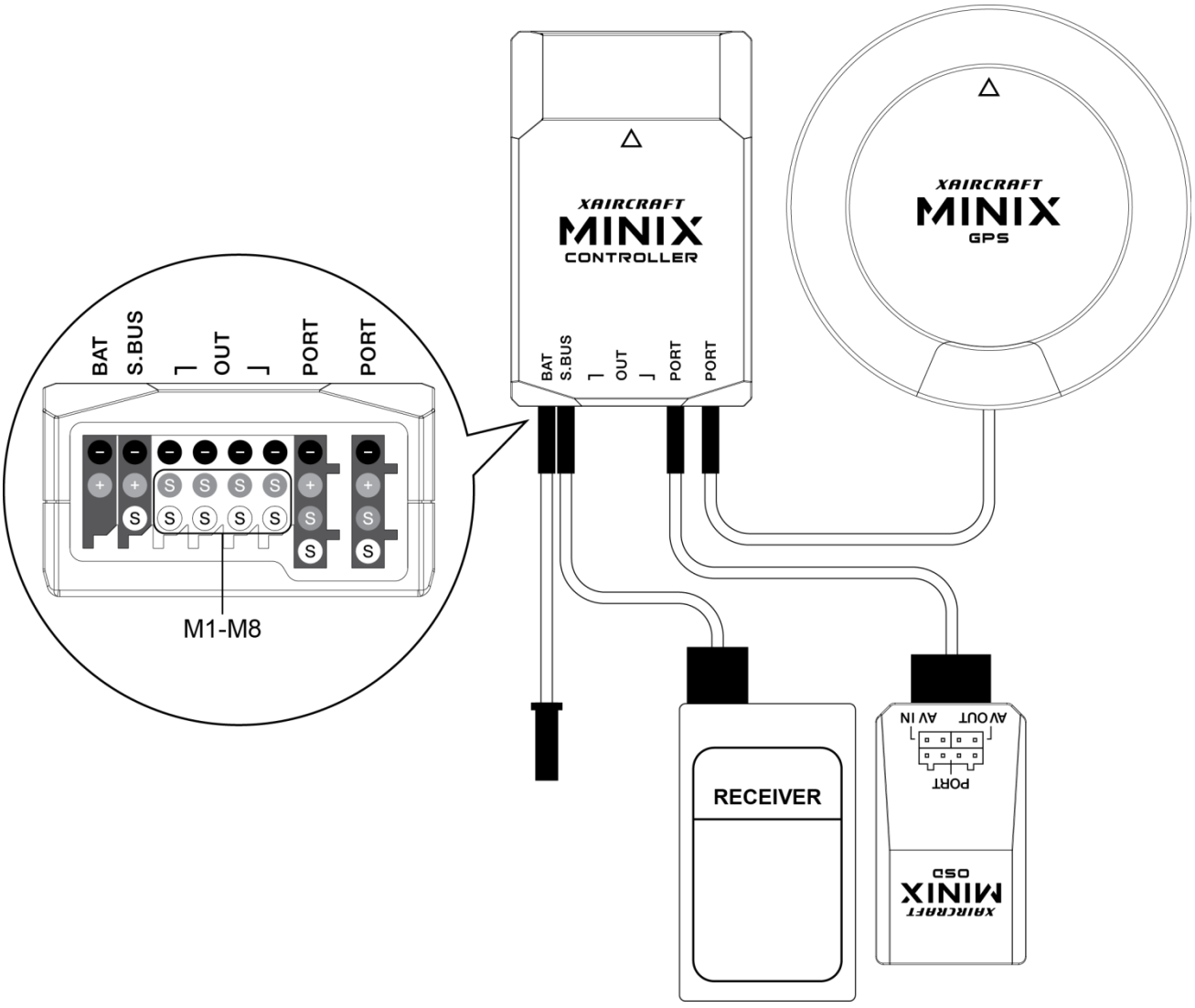
Notes for Use

Due to geographical limit and magnet influence on GPS module, please note:

1. Do not use GPS ATT Mode and Return to Home function in the areas which suffer from magnetic interference, for example, between buildings or indoor.
2. Do not use GPS ATT Mode and Return to Home function in polar region.
3. GPS module should avoid high voltage lines, and keep cables tidy around GPS.
4. When calibrating the compass, you do not have any electronic or magnetic objects such as cell phones.

Installation

Install MiniX Modules



Connect Flight Controller, GPS Module, OSD Module as diagram shows.

Flight Controller installation notice:

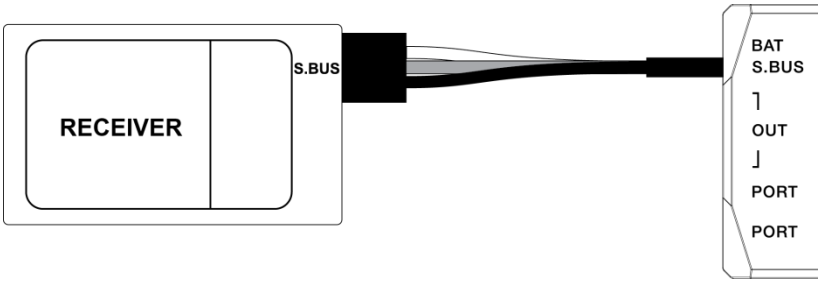
1. Should be installed in cg position on copter.
2. Should pay attention to install direction, the triangle points to the head of copter.

GPS module installation notice:

1. Horizontal install, higher than other electronic equipment.
2. Should pay attention to install direction, the triangle points to the head of copter.
3. Close to Flight Controller.
4. Far away from motor and other electric equipment.

Connection to Receiver

Connect to Receiver



Power Supply

MiniX use JST-3Pin signal (Futaba) power wire, one end connected to lipo battery and the other connected to BAT port on FC.

MiniX Connect with Computer

1. MiniX power on. (USB of computer does not supply power to MiniX)
2. After Flight Controller connected with computer, your windows shows a disk named “MiniX” in “My computer “

When you see this removable device, it means MiniX is connected to the Computer.

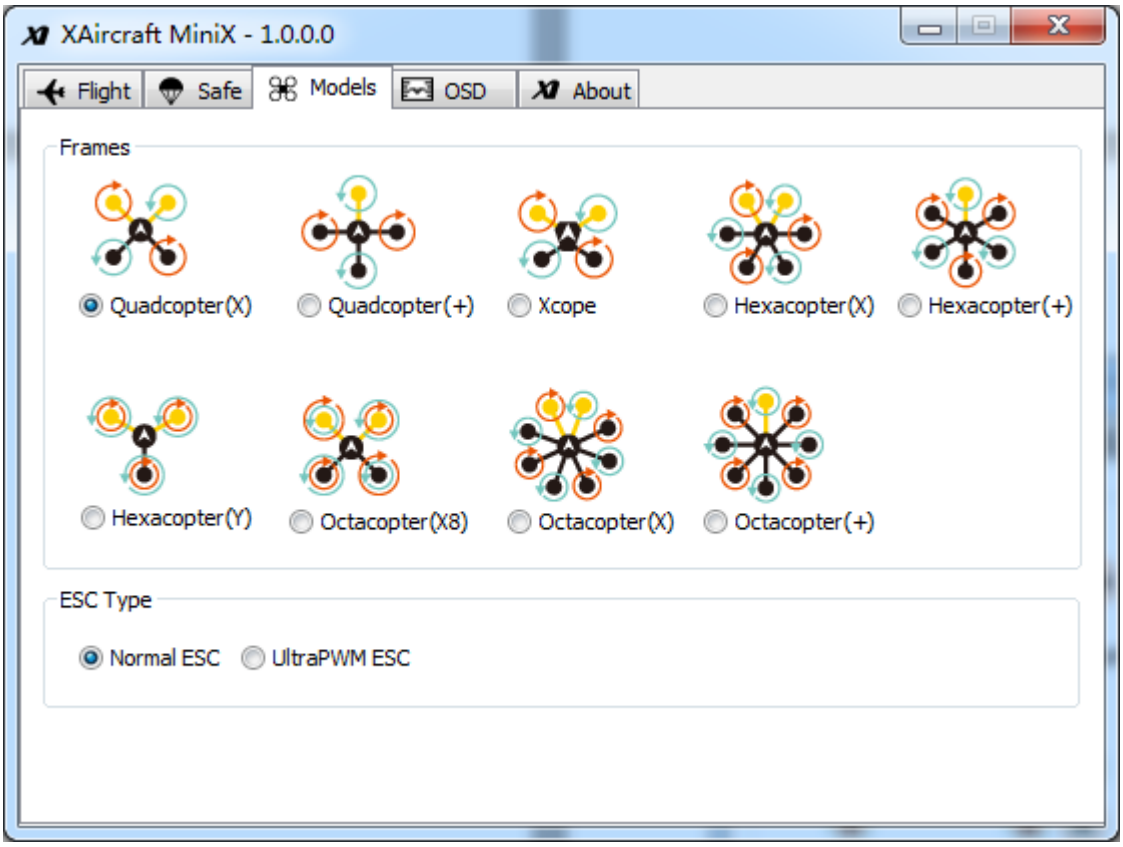
1. Configuration software of MiniX is green software. Just need to run the MiniX.exe file to open it.

Warning: Do not change any file in in the MiniX directory.

Copter Types MiniX Supports

Firmware	Copter type
Standard	Quad copter ((X and + Style) Quad copter (X and + Style) Hexacopter (X, + and Y6 Style) Quad copter (X and + Style) Hexacopter (X, + and Y6 Style) Octacopter (X, + and X8 Style)

	Supports all kinds of copter types, and custom types.

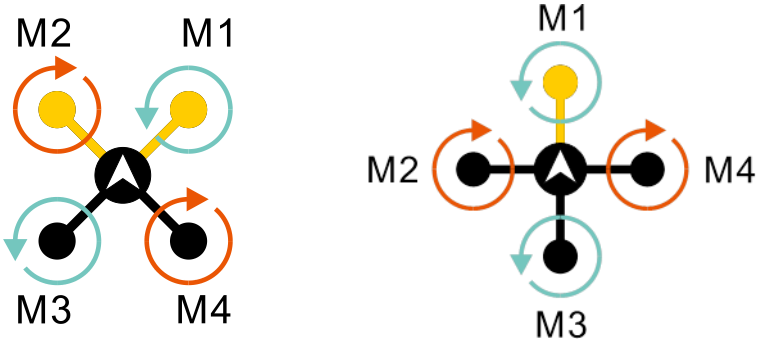


According to copter and ESC you are using; choose correct Frame and ESC type.

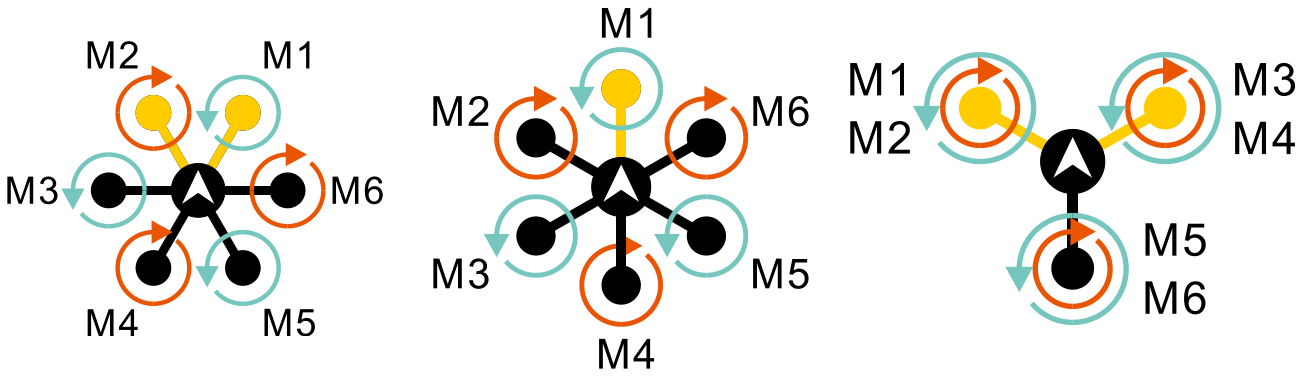
- UltraPWM ESC: for original XAircraft UltraPWM ESC, for X450, X450 Pro, X650 and X650 Value.

Notice: in the following diagram, the arrow direction means to rotation direction of motor and blade. When you install propeller, please make sure its direction downward.

Quadcopter (X and + Style)

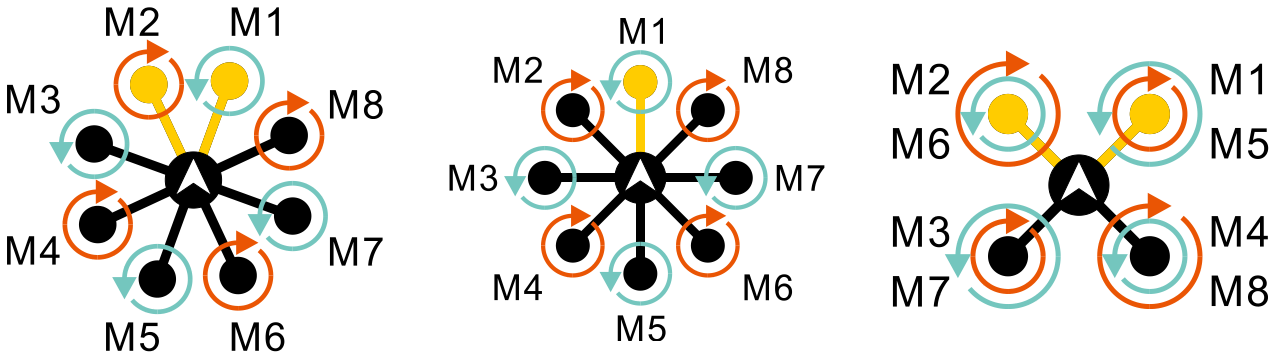


Hexacopter (X, + and Y6)



Notice: The outer-race motors are top-motors M1, M3 and M5 of Y6 copter; inter-race are bottom-motors M2, M4 and M6.

Octacopter(X, + and X8)

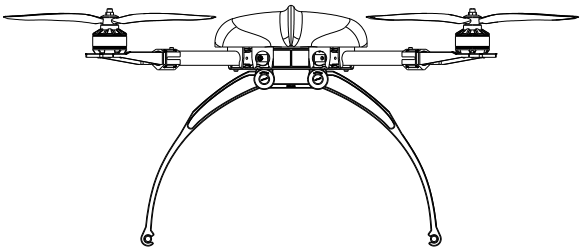


Notice: The outer-race motors are top-motors M1, M2 M3 and M4 of X8 copter; inter-race are bottom-motors M5, M6, M7 and M8.

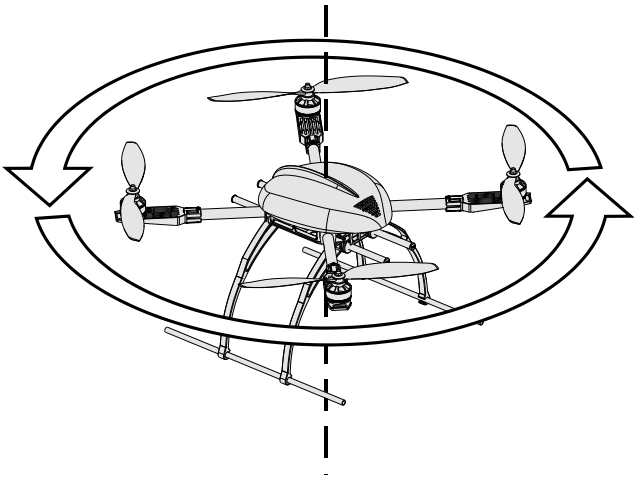
Calibration Mode

Compass Calibration

- Please make sure GPS wiring and all the channels set up properly in your RC transmitter.
- Cancel all trims on radio before calibration and throttle stick down.
- Rapidly flick the Flight Mode Switch(Channel 5) until purple flashing on LED
- Zero throttle then rapidly altering Mode Switch, LED solid green to enter Compass Calibration.
- Horizontally rotate the aircraft, LED blue slow flashing indicates horizontal calibration completed. Show as below:

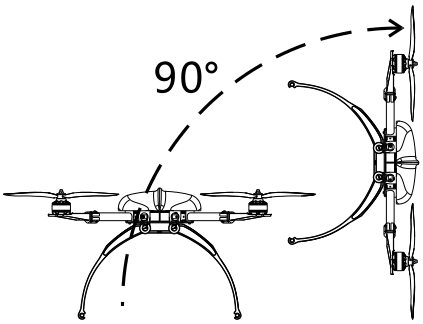


Copter stays horizontal

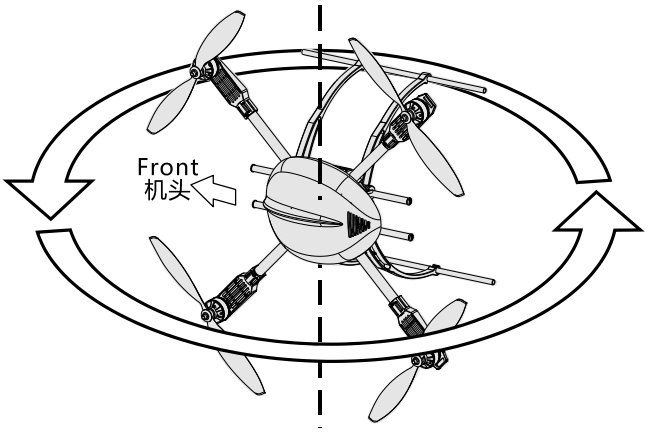


Revolving slowly until slow green LED flashing

- Then vertically rotate until solid green, show as below:



Copter side up



Rotate slowly until LED solid on

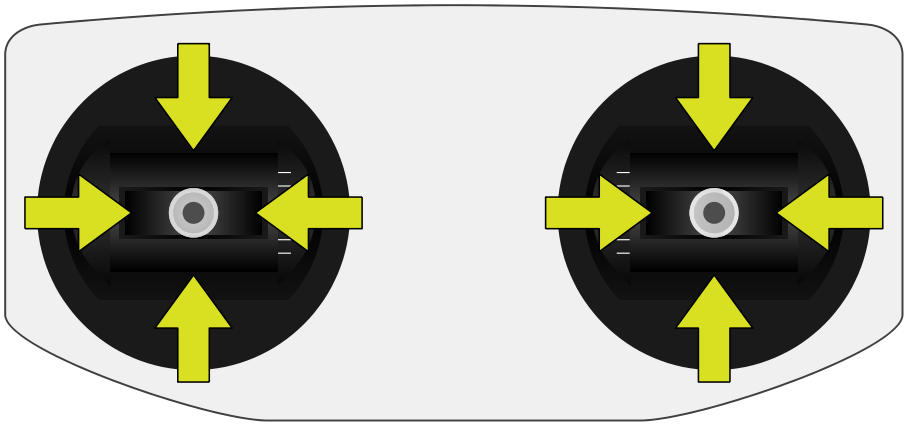
- Compass Calibration completed when re-power on.

Notes for Use

- Do not use GPS ATT Mode and Return to Home function in the areas which suffer from magnetic interference, for example, between buildings or indoor .
- If calibration keeps failing check if there is strong magnetic source interfering GPS module
- If you fly in a new place should re-calibrate the GPS Compass Module.

RC Neutral Point Calibration

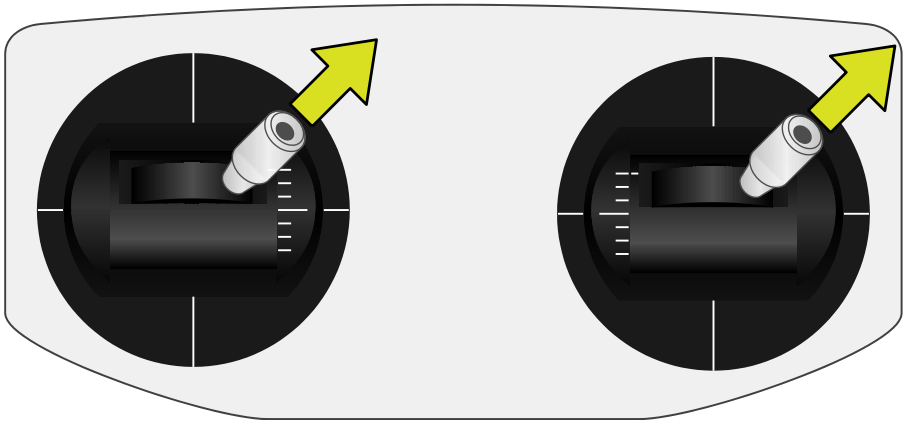
- Cancel all trims on radio before calibration.
- Rapidly flick the Flight Mode Switch until LED is flashing Purple.
- Throttle up to neutral point, Led green-green flashing, show as below
- Release stick as shown and rapidly flick the Flight Mode Switch until solid green from LED.



- RC Neutral Point Calibration completed when re-power on

RC Reverse Calibration

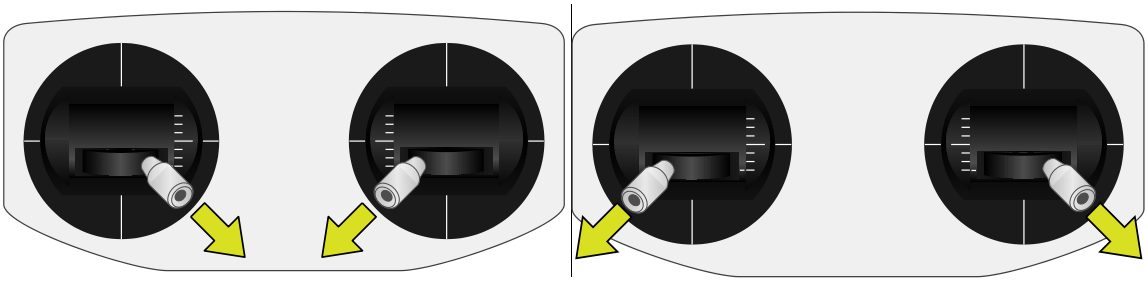
- Cancel all trims on radio before calibration
- Rapidly flick the Flight Mode Switch until LED is flashing Purple.
- Both sticks to top-right corner as shown below,LED green-green-green flashing
- Rapidly flick the Flight Mode Switch until solid green from LED



- RC Reverse Calibration completed when re-power on

Motor Start / Stop

Follow diagram as below: Push sticks both **toe-in** or **toe-out** to start motors, then motors are running slowly. If the motors do not start after the operation, please check wiring of receiver and reverse setting of radio.



Motor will stop under conditions below:

1) After motors started, if there is no pushing throttle in 3 seconds, another down-inside/down-outside operation can stop the motors immediately.
2) When copter already landed and throttle down to lowest, motors stop immediately.
3) When copter still in the air and throttle down to lowest, motors will stop in 3 seconds.

Notice: After motors stopped in the air, you can push throttle to restart the motors in 3 seconds.

The conditions motor cannot be started:

1) LED shows red or flashes red.
2) LED shows yellow with the weak interference of magnet in GPS Mode.
3) Not connect with receiver in a right way or not calibrate RC reverse correctly.

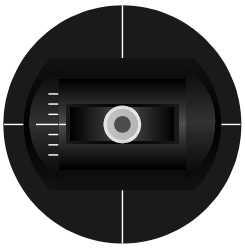
Auto Take-off

Push throttle to neutral point immediately after motors started, MiniX will auto take -off and hang about on 1.5 meters high. The height hold precision is affected near the ground; some types of small copter can get rid of the ground effect about 1 meter high.

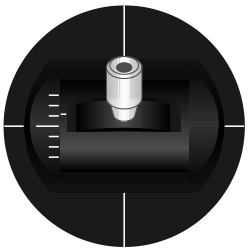
Height Hold

Notice:

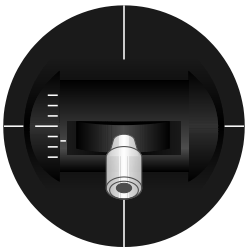
1. In manual mode, Height Hold function is unavailable.
2. In other flight modes Height Hold function is always on.



Keep Height when throttle at



Lifting when throttle higher



Falling when throttle lower

neutral point than neutral point than neutral point

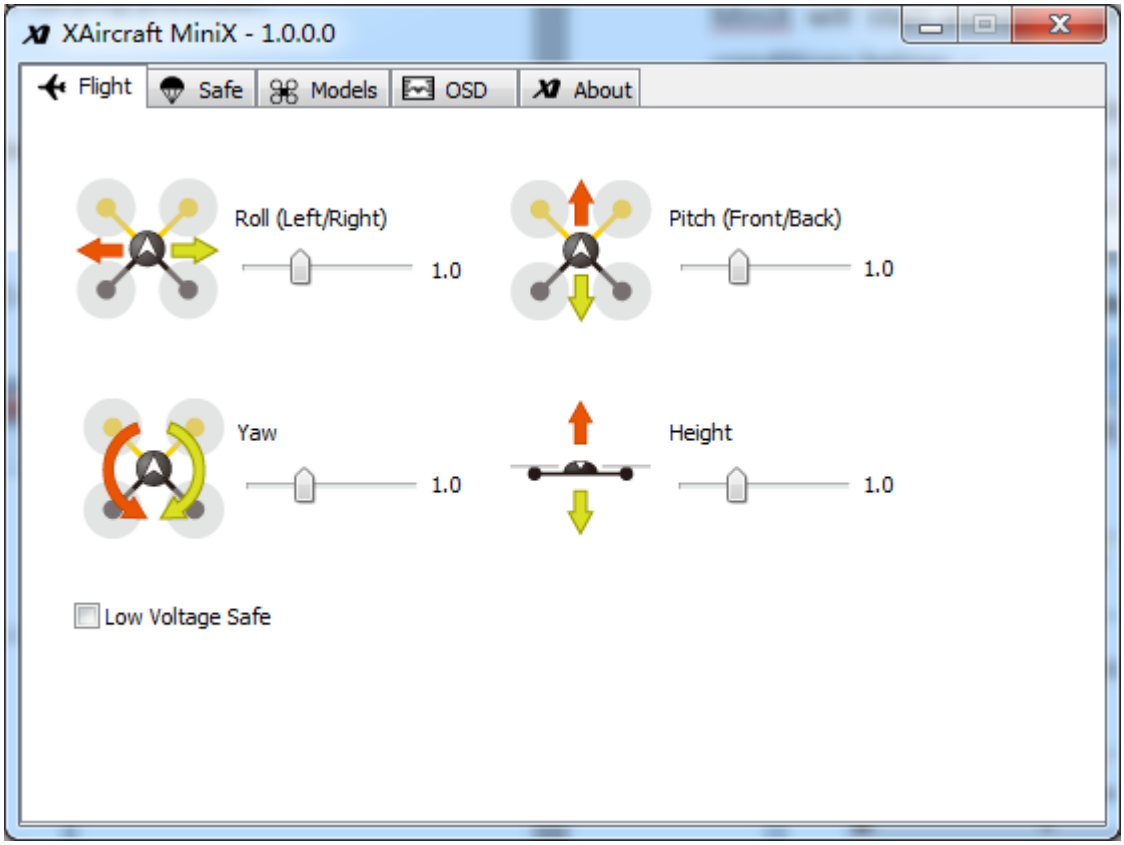
During a fast cruise flight, copter height variance is normal due to the varying pressure.

Attitude Gain

When copter payloads or power changed, or using different frames, you will need to adjust attitude Gain to profit stable flight.

Attitude Gain is divided into two parts, Basic Gain and RC Gain:

1. **Basic Gain**: needs to be set in software. A knob (RC Gain Input) adjusts the attitude gain based on this basic gain.



2. **RC Gain:** If G input on IO module is connected, you can use a knob on radio to adjust roll and pitch attitude gain. You can adjust 50%~ 200% gains on the basic gain. If it' s still not enough tuned when the knob is at max./min. position, then go to adjust Basic Gain on software.

Gain adjusts tips:

1. For first use MiniX, we recommend to use default basic gain, and center the knob on radio if G input is connected.
2. If auto-leveling is weak, turn up the attitude gain.
3. If copter jitters in hovering flight or auto-leveling, need to turn down attitude gain.
4. We recommend setting gain as higher as possible if the copter does not jitter.

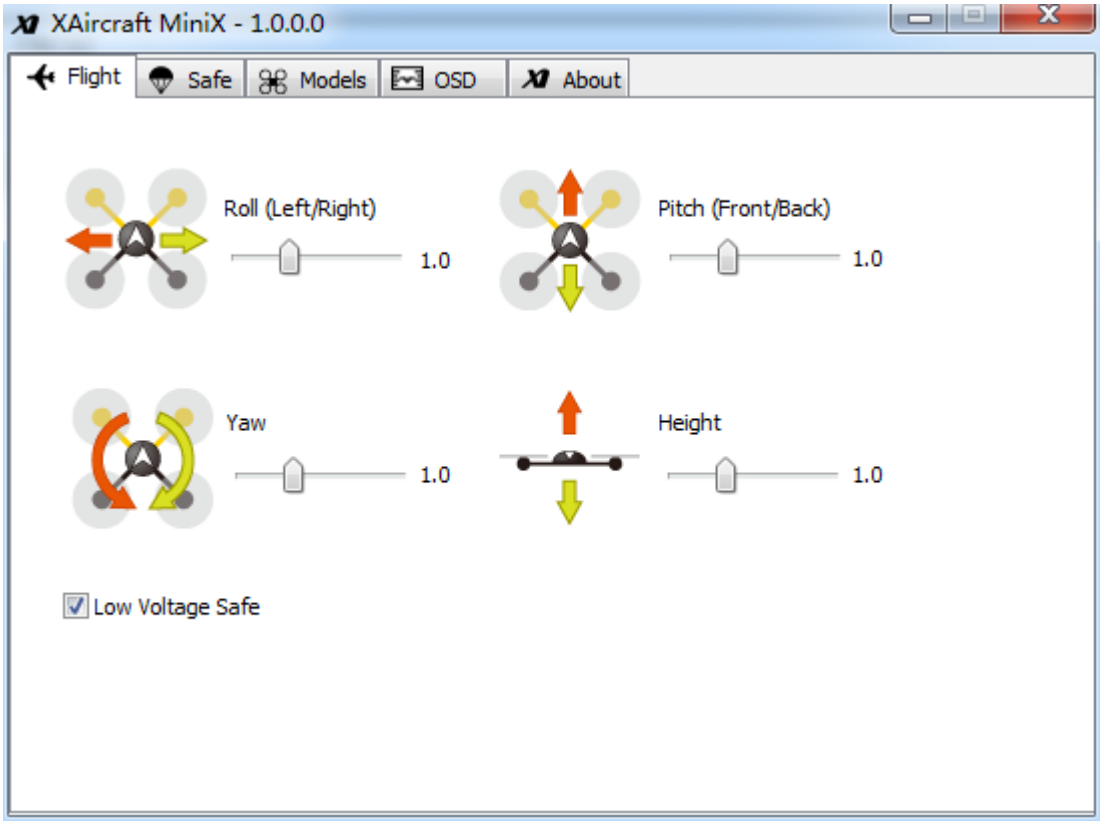
Notice:

The Gain value from RC is saved after landing. Thus, if you disconnect the Gain input, MiniX will continue use the last RC Gain to control the copter.

Under Voltage Protection (UVP)

Please select UVP protection in configuration software

MiniX can detect the capacity of Li-po battery digitally when your battery is in good condition.



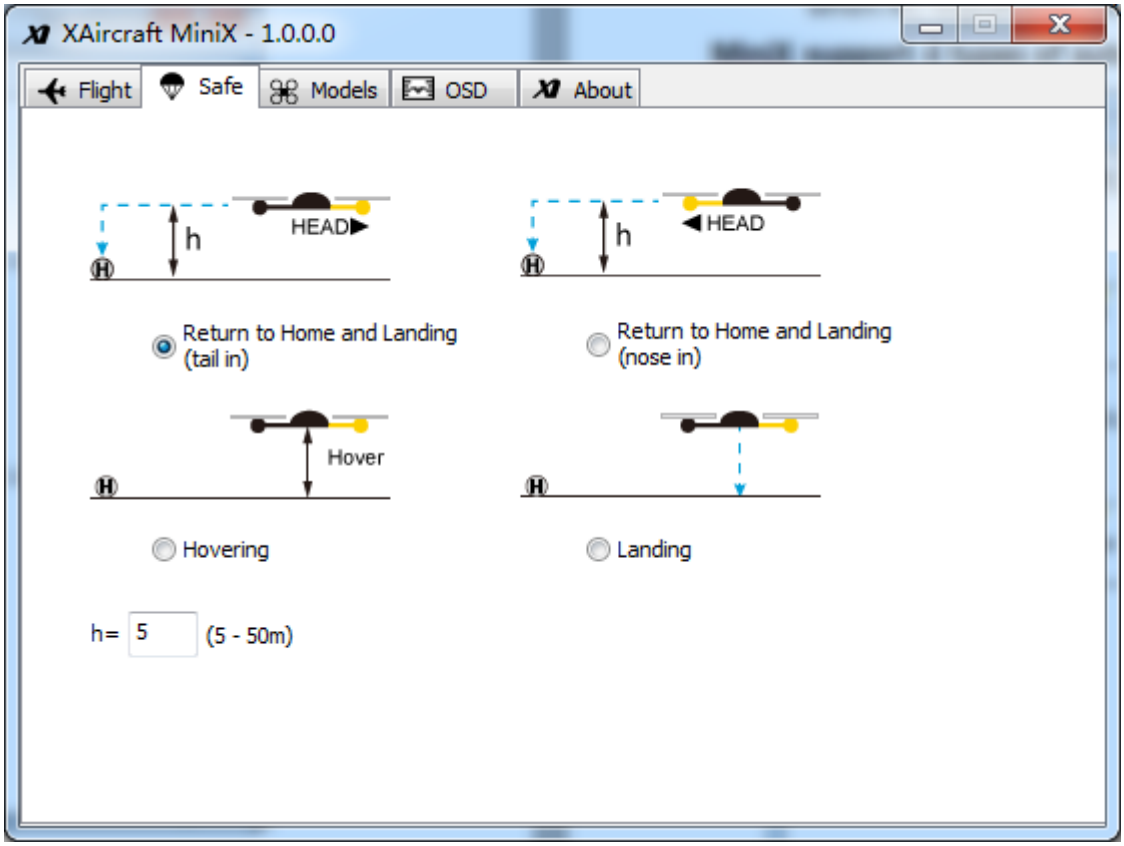
1. When voltage drops below3.6V the LED flashes Red-Red-Red. This is your low voltage warning.
2. If lower than 3.5V for 5 seconds the LED changes to fast flashing Red with the aircraft descending slowly. Add more throttle to maintain altitude until you can land safely.

Safe Mode

MiniX will start autopilot when Safe Mode is activated. The Safe Mode is activated under conditions below:

1. Manual turn on Safe Mode on radio when you lost the attitude of the copter. For example, the copter is far away and you are not clear to judge the attitude.
2. The receiver enters fail-safe mode or RC signal exception triggers safe mode unusually when RC signal lost : like over RC distance and RC signal failure.

MiniX support 4 types of autopilot for Safe Mode:



1. **Return to home and landing(tail in)**: copter turns its tail towards home (H) and then lifts up to 15m height (relative home point H), then returns to home and land.
2. **Return to home and landing (nose in)**: copter turns its head towards home (H) and then lifts up to 15m height (relative home point H), then returns to home and land. This option is suitable for FPV.
3. **Hovering:** Copter will hold its position and wait for your control.
4. **Landing**: Copter will auto-land when the Safe Mode is activated.

Manually Activate Safe Mode

Turn on Safe Mode through the Safe Mode switch on radio, and then LED shows Safe Mode. If LED does not indicate Safe Mode, please check remote control settings and the wiring of receiver.

Fail-safe Setting

Set Fail-safe on radio to make the receiver outputs "safe mode on" signal for Flight Controller when RC signal is lost.

Check: After setting fail-safe, should power on MiniX and turn off the transmitter, then the LED shows Safe Mode. If LED does not indicate Safe Mode, please check radio settings again.

About Home Position

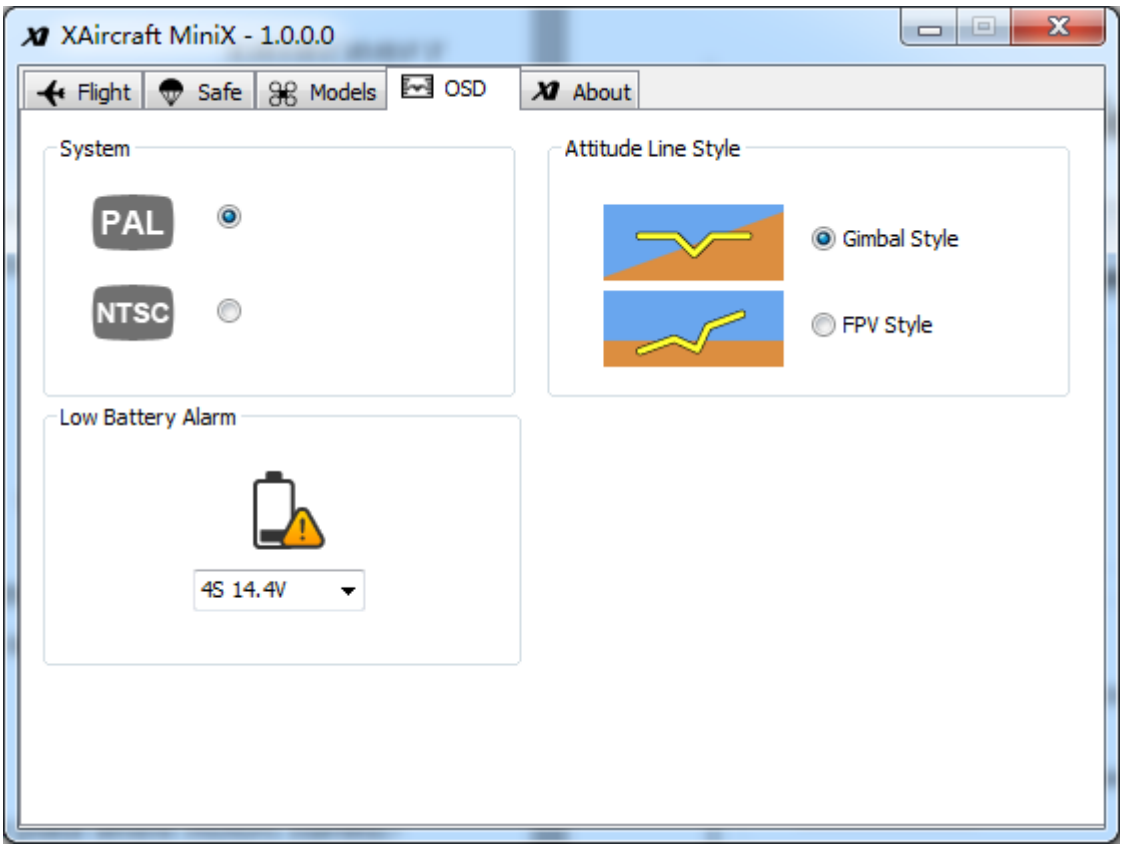
1. If GPS has good signals before take-off, the home position is the place where motors started.
2. If GPS no signals before take-off, the home position is the place where GPS gets enough satellites to work.

Get Back the Control

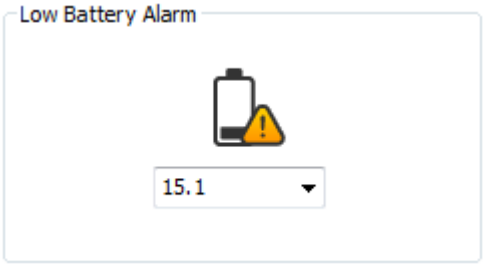
- If the RC Signal is normal, turn off the Safe Mode by switch, you will get back the control of flying immediately.
- RC signals is back to normal, if throttle is not at lowest level and the Safe Mode switch is OFF, you will get back the control of flying.

Notice: If GPS lost signals during returning to home, MiniX will auto land immediately.

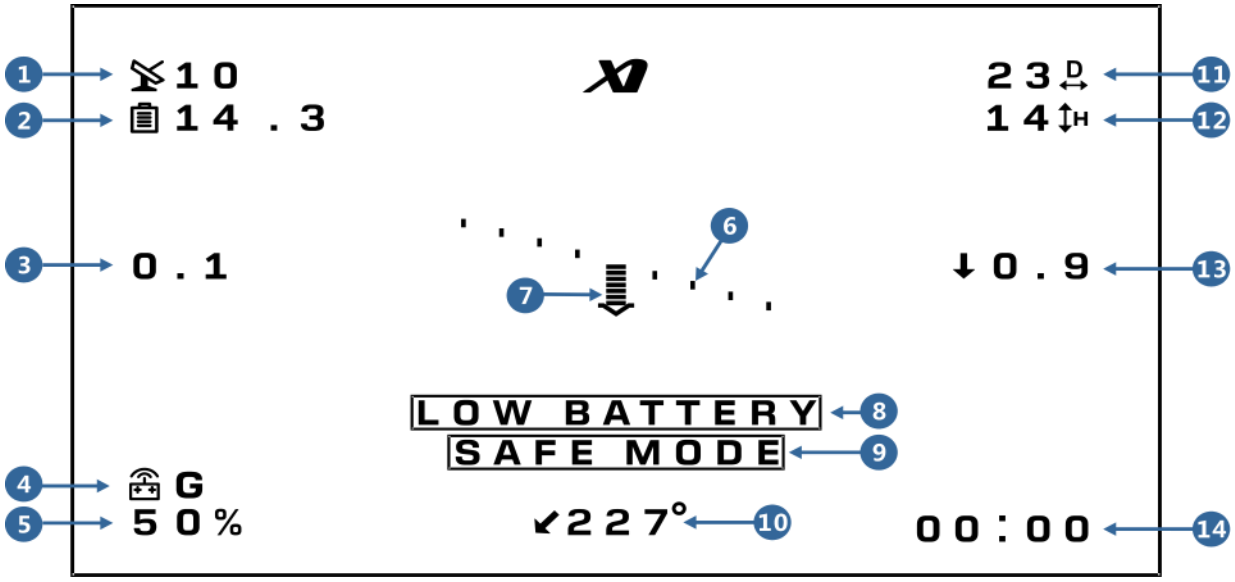
MiniX OSD Module



- **System:** choose corresponding video system according to your camera equipment.
- **Attitude Line Style**
  - **FPV Style:** For the first-person view, the horizon on the screen refers to the real horizon.
  - **Gimbal Style:** The horizon on the screen reflects the attitude angle of aircraft.
- **Low Battery Alarm:** When the battery voltage is lower than configured voltage, OSD raises the alarm. Besides preset voltage, you can enter a number directly(please use English period), the following picture shows 15.1V:



OSD Diagram on Screen



1. **Number of Satellite:** The number of satellite that GPS has picked up. There are 10 satellites in the diagram.
2. **Battery Voltage:** The voltage of battery. The diagram shows that the battery voltage is 14.3V.
3. **Horizontal Velocity:** The present velocity is 0.1m/s in the diagram.
4. **Flight Mode:** It may show M-Manual Mode, A-Attitude Mode, S-Safe Mode, G- GPS Attitude Mode or W-Waypoint Mode. The present status is GPS Mode in the diagram.
5. **Throttle:** It' s 50% throttle in the diagram.
6. **Horizontal Line:** When OSD works at the FPV style, horizontal line can be regarded as real horizon. When OSD works at the gimbal style, horizontal line can be regarded as attitude angle of aircraft. The working mode of OSD can be changed in MiniX configuration software.
7. **Pitch:** Aircraft is at the status of pitching down in the diagram.
8. **Low Battery Alarm:** When the real voltage is lower than configured voltage, OSD raises the alarm. You can set the alarm voltage in MiniX configuration software.
9. **Safe Mode:** When screen flickers this message, MiniX works under safe mode.
10. **Heading:** This heading indicates heading angle related to the take-off point. It' s nose in when it shows 180 degree; and it' s tail in when it shows near 0 or 360 degree.
11. **Horizontal Distance:** The current horizontal distance between aircraft and take-off point (over 4 satellites were found before taking off). The diagram shows 23m from take-off point.
12. **Height:** The current height from the take-off point. The diagram shows the aircraft is at height of 14m.
13. **Vertical Velocity:** A down arrow in the sketch shows that the aircraft is descending at a speed of 0.9m/s.
14. Video Channel: A display of your flight time.

Firmware Upgrade and Configuration Software Update

■ Upgrade Firmware

1. Connect MiniX to Computer.
2. Copy Firmware file (.xfw document) to root of removable disk “MINIX”, as diagram shows.

3. Eject MiniX disk.
4. Repower on MiniX Flight Controller, MiniX will auto upgrade Firmware.
5. After LED altering green-red flashing, firmware upgraded done.

■ Upgrade Configuration Software

When MiniX firmware is released, related configuration software also is updated. Using inappropriate configuration will damage MiniX configuration files so that it would trigger flight accident.

1. According to the release note of firmware, you can download the configuration software.

2. Copy MiniX. exe to root of removable disk ”MiniX ”, and then cover the old version.

3. Open configuration software.

Flight Controller Information and Language

The FC ID is a unique number for this Flight Controller, please keep it in secret.

XAircraft MiniX After-sale Service

1. Warranty Items

1) XAircraft provides a manufacturer's warranty on electronic parts caused by non-accident error or non-human error. It doesn't include the non-electronic parts like cover, wires and so on.
2) The warranty period is 6 months from the date of purchase.
3) During the warranty period, XAircraft will repair or replace for free within the warranty scope.

2. Situations below are NOT INCLUDED in the warranty

1) Users disobey the XAircraft manual while installing or operating your XAircraft products.
2) Performance failure caused by worn-out, misuse, improper operation or chemical reagent.
3) Performance failure caused by intermixed with non-XAircraft Parts.
4) Performance failure caused by modifications.
5) Performance failure on electronic device caused by liquid damage-in.
6) Performance failure caused by electronic interference.
7) Performance failure on electronic parts caused by using low quality battery or choosing an unreasonable voltage source.
8) Performance failure caused by incidents or human error such as transportation, collision, improper operation or connecting to a wrong voltage source.
9) Performance failure caused by irresistible force including but not limited by fire, earthquake, lightning and so on.
10) Damage or loss during the shipping. Please consult to the relevant logistics corporation.

3. Procedure of Service

1) When your XAircraft products have performance failure, please contact distributor/seller immediately in order to confirm the failure condition, the range and way of service. You can email us: service@xaircraft.com. At the same time, you have to offer some evidence and details:
   a) Proof-of-Purchase of XAircraft product.
   b) Product ID, you can find it in the configuration software.
   c) Description in details such as the weather, environment, operation and aircraft motion.
   d) Your contact information.
2) XAircraft or global distributor/seller strictly follows the warranty items to confirm the scope of service.
3) Users may have to pay for the repair necessary according to damage assessment which

XAircraft or global distributor/seller will contact you to confirm whether it's satisfied for you. For the repairable parts you can choose to replace under the range of warranty scope; otherwise we have to declare as a disabled product while beyond the warranty range.

5. Shipping Fee

1) Users in China Mainland have to pay for the return shipping if XAircraft product has a performance failure during the warranty items. Beyond the warranty items users have to pay for the shipping fee out and back.
2) Users outside the China Mainland have to contact the local distributor/seller for centralized treatment in order to save shipping cost.

XAIRCRAFT

support@xaircraft.com
http://www.xaircraft.com

Guangzhou JiFei Electronics Technology Co., Ltd (XAircraft) has the final power of interpretation on this manual.